Early Journal Content on JSTOR, Free to Anyone in the World

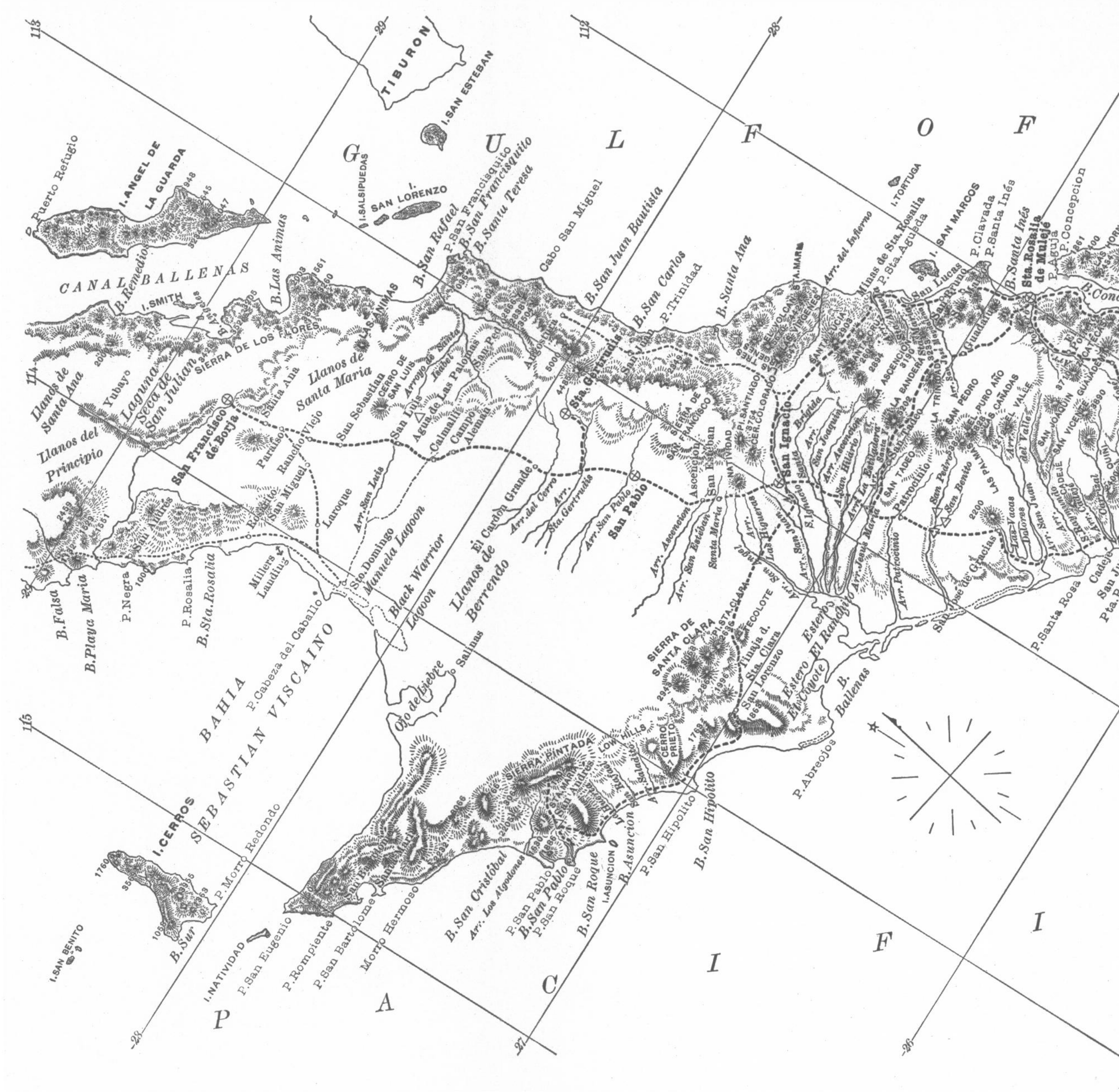
This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

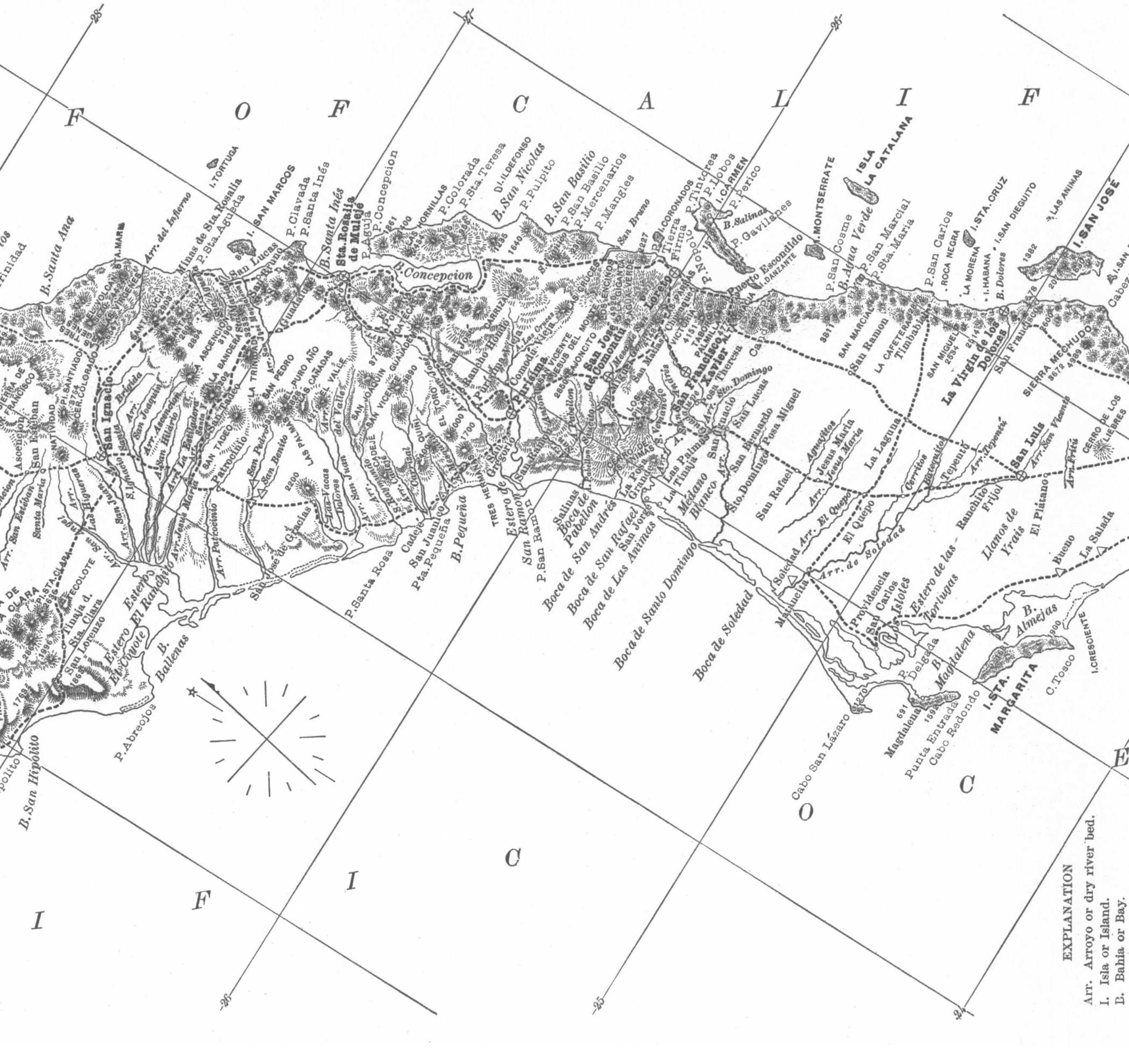
We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

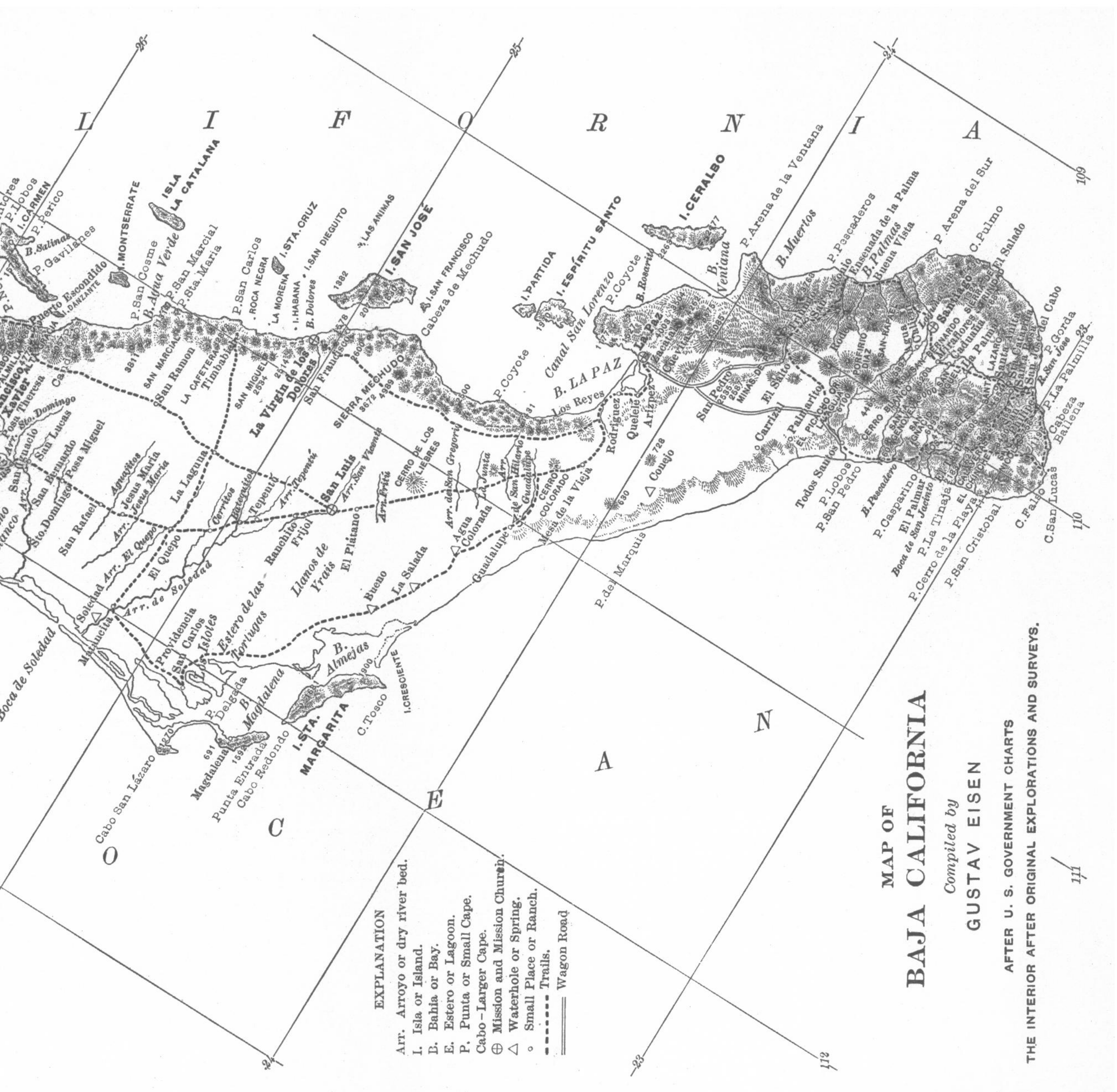
Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.



113
112
29
28
27
26
114
115
TIBURON
I. SAN ESTEBAN
G
U
L
F
O
F
I. SALSIPUEDAS
I. SAN LORENZO
I. ANGEL DE LA GUARDA
P. Puerto Refugio
CANAL BALLENAS
I. SMITH
B. Remedios
B. Las Animas
LAS ANIMAS
SIERRA DE LOS FLORES
Llanos de Santa Ana
Llanos del Principio
Yubayo
Laguna Seca de San Julian
San Francisco de Borja
Santa Ana
Paraiso
Rancho Viejo
San Miguel
Llanos de Santa Maria
San Sebastian
CERRO DE SAN LUIS
San Luis
Agua de las Palomas
Calmalli
Campo Aleman
B. San Rafael
P. San Francisquito
B. San Francisquito
B. Santa Teresa
Cabo San Miguel
B. San Juan Bautista
Sta. Gertrudis
B. San Carlos
P. Trinidad
B. Santa Ana
I. TORTUGA
Arr. del Infierno
Minas de Sta. Rosalia
P. Sta. Agueda
I. SAN MARCOS
P. Clavada
P. Santa Inés
P. Concepcion
B. Santa Inés
Sta. Rosalia de Mulejé
P. Agua
B. Concepcion
San Lucas
San Ignacio
Guadalupe
LA TRINIDAD
SAN PEDRO
SANTA LUCIA
LA ASCENCION
S. Ignacio
Trinidad
San Joaquin
San Hilario
San Tadeo
San Pedro
San Benito
LAS CAÑADAS
PURO AÑO
EL VALLE
SAN VICENTE
SAN JOAQUIN
GUADALUPE
Las Vacas
Dolores
Arr. del Valle
Arr. San Juan
San José de Gracias
Patrocinio
Arr. Patrocinio
P. Santa Rosa
San Juan
Pta. P.
Cadeje
NATIVIDAD
SIERRA DE SAN FRANCISCO
P. SANTIAGO
CER. COLORADO
San Francisco
San Esteban
Ascencion
Arr. Ascencion
Arr. San Esteban
Santa Maria
San Pablo
Arr. San Pablo
Arr. Sta. Gertrudis
Arr. del Cerro
El Cardon Grande
Llanos de Berrendo
Black Warrior Lagoon
Manuela Lagoon
Sto. Domingo
Arr. San Luis
Laroque
Millers Landing
P. Rosalia
B. Sta. Rosalia
P. Negra
B. Falsa
B. Playa Maria
P. Cabeza del Caballo
BAHIA SEBASTIAN VISCAINO
Ojo de Liebre
Salinas
SIERRA DE SANTA CLARA
P. STA. CLARA
ESCOLOTE
Tinaja d. Sta. Clara
San Lorenzo
Estero El Coyote
Estero El Rancho
B. Ballenas
P. Abreojos
CERRO PRIETO
LOW HILLS
SIERRA PINTADA
San Andres
San Bartolome
San Jose
San Miguel
San Pablo
P. San Hipolito
B. San Hipolito
B. Asuncion
I. ASUNCION
B. San Roque
P. San Roque
B. San Pablo
P. San Pablo
Arr. Los Algodones
B. San Cristobal
Morro Hermoso
P. San Bartolomé
P. Rompiente
P. San Eugenio
I. NATIVIDAD
I. CERROS
B. Sur
P. Morro Redondo
I. SAN BENITO
P
A
C
I
F
I
948
1561
2200
1760


G U L F O F C A L I F
P A C I F I C O C E
B. Santa Ana
Sta. Rosalia de Mulejé
B. Santa Inés
B. Concepcion
B. San Nicolas
B. San Basilio
I. Tortuga
I. San Marcos
I. Carmen
Isla la Catalana
Montserrate
I. Sta. Cruz
I. San José
Loreto
San Ignacio
Purísima
San José de Comondú
San Francisco Xavier
La Virgen de los Dolores
San Luis
Sierra Mechudo
B. Ballenas
P. Abreojos
B. San Hipolito
Estero El Coyote
B. Pequeña
Boca de Santo Domingo
Boca de Soledad
Cabo San Lázaro
B. Magdalena
I. Sta. Margarita
B. Almejas
C. Tosco
I. Creciente
Llanos de Yraís
EXPLANATION
Arr. Arroyo or dry river bed.
I. Isla or Island.
B. Bahia or Bay.
28
27
26
25
24



MAP OF
BAJA CALIFORNIA
Compiled by
GUSTAV EISEN

AFTER U. S. GOVERNMENT CHARTS
THE INTERIOR AFTER ORIGINAL EXPLORATIONS AND SURVEYS.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXII **1900.** **No. 5**

EXPLORATIONS IN THE CENTRAL PART OF BAJA CALIFORNIA.

BY

GUSTAV EISEN, PH.D.

CONTENTS:

1. Introductory.
2. Notes on Places of Interest between Loreto and San Roque.
3. Rainfall and Climatic Conditions.
4. Water-Courses and Springs.
5. Aspect of the Country.
6. Settlements and Agriculture.
7. The Placer Mines of Sierra Pintada.
8. Mountain Peaks and Sierras.
9. Esteros or Lagoons.
10. Possible Colonisation of the Peninsula.
11. Distances between La Paz and San Ignacio.
12. Distances from Mission San Xavier to San Ignacio by the Western Trail.
13. Distances from San Ignacio to Calmalli.
14. Distances from San Ignacio to San Roque.
15. Places on the Direct Road between Cabo San Lucas and La Paz.
16. Places from San José del Cabo to Todos Santos.

1. INTRODUCTORY.—The following account of some of my late travels in the central part of Baja California is based upon several voyages made during the last three years. My previous journeys to the Cape Region of this peninsula have already been described in the Proceedings of the Cal. Acad. Sci. in 1895 and in the Journal of the AMERICAN GEOGRAPHICAL SOCIETY in 1897. The object of these journeys has been one and the same—the horticultural, botanical and zoological exploration of the district. During my last journey from Loreto to Sierra Pintada special attention was also paid to the mineral resources of the district, and especially to the placer mines then lately discovered, and about which a "boom" had spread even to the United States. During these various voyages I have repeatedly visited at first the Cape Region, extending from Cape San Lucas to La Paz, and later on the country north of La Paz to near

the 29th parallel. My last voyage (June–August, 1894) extended overland from Loreto to Sierra Pintada, a rocky promontory on the Pacific side west of San Ignacio. As the incidents of these trips are less interesting from a geographical point of view and more suitable for a book of travel, I will in the following paper confine myself to such data and details as will illustrate the nature and aspect of the central part of this very interesting and yet little-known peninsula. In this connection I wish it to be distinctly understood that what is said here relates exclusively, except where otherwise stated, to the central part of Baja California. Both in the Cape Region and in the northern part of the peninsula the conditions are somewhat different.

The most easy way to reach the southern and central parts of Baja California is by steamer from San Francisco, one leaving the 7th day of every month. It takes two days to reach Ensenada de Todos Santos, on the Pacific coast, near the United States boundary line, and it takes four additional days to arrive at San José del Cabo. At this place the steamer stops half a day or so, and there is opportunity to visit the town and the many interesting gardens and plantations surrounding it. In two days more we arrive with the same steamer at La Paz, the capital of the southern district of the peninsula. Here we exchange our commodious steamer *Curaçao* for the miniature steamer or tugboat *Rio Yaqui*. This little miserable boat—which, I understand, now lies at the bottom of the Gulf—was never intended to accommodate any passengers. It had only berths for six, but the company had sold tickets for 75 persons, and consequently there was no room even to move. However, after two days we reached Loreto, and landed without any adventure with the sharks. At Loreto we remained long enough to get an outfit, consisting of mules and a guide. The principal merchant in town, Don Juan Antonio Romero, took us kindly in hand, and did us much valuable service. He even extended his courtesy so far as to accompany us to San Xavier. San Xavier, or rather San Francisco Xavier, is one of the most interesting places in Baja California, the beautiful Mission church being the handsomest building on the peninsula and the best-preserved Mission church on the Pacific coast outside of the mainland of Mexico. It is built of cut stone in a noble Romanesque style, and is worthy of special care by the Government. However, this care, so necessary in order to preserve it, does not seem to be forthcoming, and as a consequence the inevitable destruction will soon follow. At the first approach to the narrow cañon in which this church suddenly looms up, one is amazed at the presence of such a beautiful structure in such an isolated place. Surrounding the Mission there are now, perhaps, only fifty acres in all cultivated and irrigated, while enclosing these rise tremendous perpendicular walls of a narrow gorge, beyond which on every side are other narrow cañons and desert hills without water and without population. The explanation is that formerly this country was inhabited by numerous Indians, whom the missionaries struggled hard to convert and civilize. As there was a small but constant stream of water in this cañon, a Mission was early established there. The beautiful church was built partly and principally with money derived from the pearl fishery, which in early times was much more profitable than now.

It was our intention to follow the trail from San Xavier northwards through the central part of the peninsula as far as San Ignacio, and from there to strike across to the rocky promontory of Santa Clara and Sierra Pintada. But circumstances made it necessary to return to Loreto, and after some new arrangements, to make a new start direct for Comondu. I had at first intended to follow the central route or trail which passes over the mountain chain or sierra, but I soon found that this route was entirely impracticable for any one with limited time. The sierra is only rarely traversed by any other than stock men, and the trails are not such as can be used by pack animals without much loss of time. After the first few days of struggle over rocks and down steep ravines, I decided to follow the least difficult and tedious trail in order to reach Santa Clara within the time previously set. From Loreto there are three different trails running parallel through the peninsula, northwards as well as towards the south. One trail follows the east or Gulf coast, another passes along the backbone of the sierras, and a third one passes more to the westward, here and there skirting the Pacific and now and then turning towards the centre in order to touch some small town or village. This latter trail is by far the most travelled of the three, as it is also the least troublesome to follow. When we speak of trail or road in this part of Baja California we must not misunderstand the meaning. There is no such thing as a road in the central part of the peninsula, and what we designate as trail is often only a more or less distinct path made by the mules and cattle. In very few places has any work been done in order to improve the trails, except in the immediate vicinity of the villages, where it was absolutely necessary to do something in order to prevent loss of life and property. It appears, however, that during the early part of the Spanish occupation some work was done with the aid of Indian labor, which at that time was to be had, and there are traditions that some remarkable roadwork, the remains of which are yet seen in the vicinity of San Ignacio, was actually made by the Indians before the Conquest.

I will now shortly refer to the places passed through on my last trip. It must be remembered that the name of almost every place mentioned is also the name of the arroyo or river-bed in which it is situated. Many places referred to are mere ranches, some of which are only inhabited during the rainy season, on account of absence of permanent water supply. In the central part of the peninsula—from La Paz northwards—there are only very few places which might be called towns. These are San Luis, Loreto, Comondú, Purísima, Mulejé, Santa Rosalia, and San Ignacio, and even the best of these are only villages. However, in a country where no larger places exist the smaller ones become of importance, and even ranches and arroyos are given a prominence which they would not attain in more settled countries. We must remember that in Baja California the traveller is happy if he can find water enough to satisfy his thirst, and, accordingly, water-holes even become of unusual importance and worthy of being marked down and correctly located on the map.

At this place I will take occasion to say that the peninsula which to us is known as Lower California is known to the Mexicans as Baja California. The southern part of our own California is known to ourselves as Southern California, and it is of importance in speaking of these countries not to confound the names of the two. To the Mexicans, as well as to the early settlers—the Forty-niners—in our California, this, our State, was known as Alta California, which in English means Upper California. In order to make clear what country is meant I have often used this word as a distinction from Baja California.

2. NOTES ON PLACES OF INTEREST AND IMPORTANCE BETWEEN LORETO AND SAN ROQUE.—LORETO, once the most prominent place in Baja California, is now a mere village of a few hundred inhabitants. The once fine church, with its famous "Virgen de Loreto," is now in ruins. From Loreto the road or trail passes due west, ascending the Sierra and passing the crest at a point called Las Parras, situated at an elevation of about 1,800 feet. Stopping-places are San Telmo, where there is a spring of water, and San Matías—the latter only a camping-place for the night, about 1,800 feet above the sea.

San Matías.—Camping-places on the road are Santa Isabel, where lunch is taken; Santa Lucia, a ranch with water; Arroyo Palmadito, so called on account of groves of the large fan palm (*Washingtonia Sonoræ*). Mesa de los Pilares is a high table mountain to the left. Camp at a ranch, El Quiñi, where water is found.

Quiñí.—Starting at sunrise from El Quiñí, we reach Comondú at 9.30 a.m. It is said to be about sixteen leagues between Loreto and Comondú—not in a direct line, but as the road runs. At Comondú there are two settlements in the same arroyo. The village proper situated further down the arroyo is known as San Miguel de Comondú, while the Mission, situated one league higher up to the east, is called San José de Comondú. Comondú is one of the most important places in Baja California.

Comondú.—Leaving Comondú in the early morning, we rest at noon in the Arroyo Pabellón, and stop at night at San Vicente, a ranch where water is found. Between Comondú and San Vicente the distance is about eight leagues.

San Vicente.—Leaving that place in the early morning, we reach the village of Purísima at 9.30 after a two-league ride. From Comondú to Purísima is said to be from nine to ten leagues. Purísima is situated eight leagues from the Pacific Ocean, and from eighteen to twenty leagues from the Gulf. From Purísima to San José de Gracia there are said to be forty leagues. In Purísima we remain several days in order to recuperate the animals.

Purísima.—Leaving Purísima in the afternoon at 3, we reach camp at the Arroyo Guajademí, where only bad water is found. Guajademí is also the name of a high mountain peak.

Guajademí.—Starting at 6 a.m., we camp at noon in the Arroyo El Mezquital. At San Juanico, close to the shore of the Pacific, we find water at 5 p.m. But, as there is no feed for the animals, and as the water is undrinkable on account of the multitude of coyotes which visit the spring nightly, we continue on the road a few miles to a small arroyo, El Mezquitito, where there is feed for the mules, but no water.

Mezquitito.—At this place there is nothing but open desert and an arroyo a few feet deep. We start at sunrise and arrive at Cadejé at 9.30 a.m., after having passed the arroyo of Carrizal.

Cadejé.—There are half-a-dozen houses and quite a stream of good water and some plantations. Between Carrizal and Cadejé there is a league and a half. From Cadejé to San Raymundo there are two leagues, and from San Raymundo to San Juan there are two leagues more. At San Raymundo there is water, but we pass on to the Arroyo San Juan, where we camp. Here there is no water. The arroyo of San Raymundo is one of the largest in this part of the country; but there is little water found there, and that is bad.

SAN JUAN.—From this place to Los Dolores, a small arroyito, there is a league and a half. From Los Dolores to Arroyo de las Vacas about a league and a half. From Las Vacas to San José de Gracia there is about one league. As there is an abundance of water at this place, and some very fine orchards and other plantations, we camp here early in the afternoon.

SAN JOSÉ DE GRACIA.—A small village. We start early in the morning and camp at the ranch San Benito at noon. Here is plenty of water for stock and some for irrigation purposes, but the land is limited. We start again in the afternoon and reach in the early evening Patrocinio.

PATROCINIO is situated twelve leagues from the Pacific Ocean and about thirty leagues from the Gulf of Cortés. Patrocinio is a small hamlet, with, perhaps, fifty houses of the most poverty-stricken kind. We start early in the morning and rest at noon at Jesus Maria, where there is water, and camp at night at the Arroyo Estiladera, where water is also found.

ESTILADERA —We leave early in the morning and rest at noon at a ranch, San Joaquín, where running water is found. At night the same day we reach San Ignacio.

SAN IGNACIO.—This is the largest place in the central part of Baja California; but as more will be said about it later, I will content myself here by stating that San Ignacio is the meeting-place for all the trails in this part of the country. Mules and guides can be readily procured here. From San Ignacio a vast plain extends to the Coast Range on the Pacific side. This plain is at present an immense desert, with little or no water, and difficult to cross. Until the year of my visit this plain was seldom traversed, but on account of the discovery of gold in the Sierra Pintada a stream of gold-seekers had now found their way across this barren and inhospitable country, and a regular trail had been trodden in the sand —so plain, indeed, that there seemed little or no danger of getting lost. Still, several parties had gone astray, and some had lost their lives in the sandy waste. We leave San Ignacio after having procured a new outfit of mules and a guide, and start down the arroyo at 3 P.M. Camp on the plains between the arroyos San Juan and San Angel. At San Angel is the last water to be found, and we must traverse the plain without further supply, the next watering-place being the Tinaja de Santa Clara.

SAN ANGEL.—We start early, and after a few hours' ride arrive at the arroyo of San Angel. Several springs in the arroyo, and the water is fair in at least one of them. From there the road leads across the desert due west and we begin to ascend the Santa Clara mountains in the evening. Camp in the foot-hills, or rather on the slope of the mountain, near a peak called the Tecolote (the Owl), on account of its resemblance to an owl's head.

EL TECOLOTE.—As there is no water at this place, and as we have had no water since six yesterday morning, we start early only to find that the mules have run away. It takes several hours to find them, and a long delay is caused. We arrive at 9 A.M. at the Tinaja de Santa Clara, a deep water-hole in a gulch. This water is the best in the whole of this region; but thousands of human beings and mules have drunk the pond almost dry, and the water has been much contaminated. We rest here only long enough to recuperate, and reach in the evening the arroyo of San Lorenzo, where there is another water-hole. But as this water is said to cause the death of animals, and as poisonous plants are said to abound near the arroyo, we consider it best not to tarry here but to start up the coast. At 10 P.M. we reach a place suitable for camping at the foot of Cerro Prieto. Here is no water and scarcely any feed. Having ridden since sunrise, or about eighteen hours, we are completely worn out. This is a desolate place and the most inhospitable camp.

CERRO PRIETO.—The camp is named after a dark hill standing out prominently from the other more distant mountains. We leave as early as is possible, the mules, as usual, having run away in search of food. We ride all day and pass two small arroyos, Saladito and San Rafael. In both there is some salty water in shallow, dug wells. We stop at noon at San Rafael and camp at night at La Huerta, a most beautiful little arroyo, where, however, there is no water—no well dug. But there is an abundance of finest feed and many flowers. Thousands of cotton-tail rabbits. Everything indicates that water is very near the surface. Between Cerro Prieto and La Huerta rain has lately fallen, and there are many flowers.

LA HUERTA.—The name is given by our party, no name existing previously. We start rather early, long before sunrise at 3 A.M., and arrive at San Andrés in time for breakfast. The bed of La Huerta is covered with large clumps of mezquite trees.

SAN ANDRÉS.—This place is merely a camp for the miners. There is one house and a dozen tents. There are also about a dozen dug wells at the base of a hill. From these wells water is carried on donkeys to the placer mines, some sixteen to twenty-five miles due east, up in the mountains. From San Andrés there are only a few miles down to the landing-places of San Roque and Asunción, the latter being the safer. Both are open roadsteads and only poorly protected by promontories.

3. RAINFALL AND CLIMATIC CONDITIONS.—The climatic conditions of Baja California are but little known. The peninsula receives its rainfall from two distinct sources and at two different times. In a former paper I have stated that the rainfall of the Cape Region from La Paz to San Lucas differed from that of the other part of the peninsula. This statement is not quite correct, as several visits to the central part of this country have satisfied me that the change from the tropical region to the one next north of it is not as sudden as at first I believed. The general rule is that Baja California enjoys summer rains on its Gulf coast, while on the Pacific coast it receives principally the scanty winter rains. The summer rains are the tropical rains which originate in the Gulf of Mexico, and are carried over the Mexican mainland and precipitated on the higher eastern coast of Baja California. These rains are strongest in the Cape Region, or rather on the mountainous part of the Cape Region in the vicinity of San José del Cabo, and diminish from there towards the north. At La Paz rain does not fall every year. But north of La Paz the rainfall on the Gulf coast begins to increase, this being due to the high and narrow sierra which follows closely the line of the coast, and extends almost uninterruptedly as far as Alta California. It follows that the whole country enjoys to a larger or smaller degree the benefits of these tropical summer rains, which, however, are neither general nor certain. While the high sierra always receives thunder-showers in sufficient quantity to procure a crop of grass for the stock, the lower regions receive much less rain, and that at a slightly later time. Thus the eastern coast has rain every year in small quantities as early as July, while the western coast may get its rain a month or so later, if at all. The western coast may not have any rain for three or four years at a time, while on the eastern coast the rain may be considered regular, though scant. On the eastern side the summer rains extend,

as stated, as high up as to California, while on the western slope San Quintín may be said to be the highest point north to which the tropical summer rains ever reach. This is the more worthy of notice as the peninsula is so very narrow. The reason is, however, evident. The tropical rains coming from the south precipitate on the cooler eastern sierra; but as the country is gradually sloping towards the west, it follows that this part is less frequently cool enough to precipitate the rainfall. This tropical rainfall can be traced as far up as the centre of Alta California. Here it manifests itself by occasional thunderstorms in the Sierra Nevada, generally in the month of August. It is the same tropical rain-belt that furnishes Sonora and Arizona with their summer rains, which occasionally extend even over the Yuma and Colorado deserts.

As regards the quantity of rainfall nothing is certain, as no measurements have ever been made. I estimated the rainfall in the sierra of the Cape Region at some thirty inches. It is safe to say that this rain diminishes as we proceed northwards. It is dependent upon the height of the sierra. The high peaks receive more than the lower ones and the mountains more than the lowlands. At the high San Pedro Mártir, which probably is over 10,000 feet high, the rainfall is probably equal to that in the sierra of the Cape Region.

The other source of rainfall is the northern rains from Alaska. The west coast of Baja California gets the tail-end of these rains—not regularly, but in a most sporadic manner, and as far down as to the Cape San Lucas. These rains, which generally come late in the winter, in January or February, can never be depended on. They may come every year for several years in succession, or, on the other hand, they may be absent for from two to ten years.

As has been stated, the summer rains commence generally in July and last until October. They are most capricious as regards time and locality, and while one place may be deluged another close by may never receive a drop. This is frequently seen in passing through the country. In some places I found flowers and grass in abundance, and the animal life was represented by thousands of snails crawling on the bushes. A few yards or a mile away everything was barren, dry and dead, no rain having fallen there for years. When the water comes down it generally comes in torrents, washing everything before it. This torrential rain, which may amount in a single shower to three or four inches, has thus rarely the opportunity to sink deep in the soil. On the contrary, it carries everything before it, and leaves its trace behind in the formation of the precipitous walls of the cañons and in great washouts. The amount of rain that may fall in a single season has never been ascertained. It is probably much greater than would appear from the vegetation on the ground, most of it running to waste before entering the soil. From experience in Alta California I doubt if the annual rainfall anywhere on the east or Gulf coast will reach ten inches, except, perhaps, in the highest peaks, where torrential rains are more frequent. On the western, or Pacific coast, the rainfall probably seldom reaches even six inches. But as this scanty rain falls at a time when there is little or no frost, it enables the vegetation to start at once, and every drop almost which sinks into the soil is utilised by the immediately sprouting plants.

To recapitulate and summarize, we find that the peninsula of Baja California is only scantily supplied with rain. The summer rains extend from Todos Santos and Cabo San Lucas, in the south, as far up as to the Sierra Nevada, in the northern part of Alta California. These summer rains are most frequent and heavy in the Sierra backbone, which runs along the east coast of Baja California; but it extends also down to the east shore-line as well as to the western coast. Thus the central strip, half way between the two shores, receives more or less rain yearly, but as we approach the Pacific shore the rain becomes more uncertain and sporadic during the summer time; this being due to the absence of high mountains on this side. But this want of summer rains is to a very slight extent compensated by the presence of winter rains, which now and then extend from Alta California down to the Pacific coast, even as far south as San José del Cabo. These winter rains never enter the Gulf, and they diminish in quantity and regularity as we go south. Down as far as San Quintín they may be considered fairly regular, but below this point they become very uncertain. The reason why San Quintín appears to be somewhat of a terminus for both the southern and the northern rains is probably due to the vicinity of the highest mountain or sierra in Baja California. The height of the San Pedro Mártir sierra is such that it precipitates with facility both the rains coming from the north during the winter and from the south during the summer time.

4. WATER-COURSES AND SPRINGS.—The torrential rainfalls give to the whole of Baja California its characteristic appearance. The country consists of one mass of parallel arroyos or dry water-courses, the majority of which carry water only during and immediately after the rains. During the rainy spells the water in the

arroyos carries everything before it, but as soon as the rain is over the water disappears. Only in a few arroyos is there any kind of permanency as regards the water supply, this being mainly due to the nature of the rock or strata underlying the river beds. Thus, in the arroyo of La Purísima we find a succession of water-holes, some probably one hundred feet deep. Between these water-holes the water flows the year round in a tiny streamlet—enough, however, to secure a fair supply for irrigation, while in the deep water-holes we find fish and water terrapins of large size. Nowhere else are there as many water-holes as in La Purísima, and looking down on the arroyo from the top of the mesas, it appears as if there was actually a broad and continuous stream coursing down the cañon. But this is a deception, and upon closer inspection we find that there is a mere succession of water-holes, with the tiniest stream of water passing from one to the other. This, of course, refers only to the end of the dry season, as during the early part of this season, and after the rains, a large quantity of water runs down the river-bed. Of all the arroyos in this part of Baja California that of Purísima carries the largest amount of running water. In some other arroyos we find fair supplies of water for irrigation, but the water is of a different nature, as concerns its origin.

We now come to a feature highly characteristic of Baja California—springs and water-holes. We will first consider the former. Springs, in the sense understood in the United States, are rare in Baja California, and I know of comparatively few places where water gushes out of the hillside, forming a regular spring, such as we find everywhere in rainy climates. In the mountains of Baja California such springs are naturally less rare, but on the lower lands we may hunt for them in vain. Wherever springs are met with, in ninety cases out of a hundred they are situated in the river-beds or in the beds of otherwise dry arroyos. They either gush out from the bottom or from the sides of the cañon walls, and we are almost sure to meet with a farm or a village close at hand. The majority of these springs are small and do not suffice for extensive irrigation, but in a few instances they are enormously large and sufficient to irrigate thousands of acres. I have in a former paper on the Cape Region called attention to the large spring at San Bartolo which pours out from under a stratum in the bank of the cañon and actually forms a small creek of its own, irrigating the whole cañon for several miles. A similar condition exists at Comondú and at San Ignacio. At Comondú we find two large springs rushing out from under rocks in the dry river bottom and supplying a settlement of several thousand acres. The two springs are situated perhaps one hundred feet apart, one on each side of the narrow cañon, and each must carry some ten feet of water per second. The supply has always remained the same as far as the memory of man goes. Above these springs the cañon is dry and barren, while below them we find a most luxuriant and tropical vegetation of date palms, bananas, figs, sugar-cane, etc.

The most famous of all these springs is, however, the large spring or springs of San Ignacio. These springs originate also in the bottom of the cañon, and so great is the water supply that a regular creek is formed, which not only irrigates the country for miles below but in places forms regular swamps. From these springs some fifty thousand date palms are irrigated, besides fields of maize, beans, etc. Smaller springs of a similar nature are found in many arroyos, as, for instance, at San José de Gracia, San Benito, and hundreds of other places. Water-holes constitute a feature peculiarly characteristic of Baja California. These water-holes are found only in the bottom of some arroyo, generally in the trap rock. If it were not for these water-holes all travel in Baja California would be impossible during the dry season. In order to find the holes it is necessary to have the assistance of a guide, as there are no superficial features which would indicate them from a distance. We come upon them suddenly and lose sight of them as suddenly again, hidden as they are between perpendicular rocks and often without any surrounding vegetation large enough to be seen at any considerable distance. In many of these holes small fish as well as water terrapins—the latter known as *ahuamas*—are found, indicating that the water supply must be constant. Such water-holes are known to the natives as *tinajas*. They are found in the most unexpected places, the large Tinaja de Santa Clara, for instance, being situated high up in the Santa Clara mountains, among rocks of extreme barrenness.

5. Aspect of the Country.—The central part of Baja California may be described as a vast elevated plain covered by a thick layer of trap rock. Above this plain there rises all along the east coast a high crest, a sierra of granite, the peaks attaining a height of from 2,000 to 3,000, and in isolated instances even as high as 10,000 feet. From this main sierra the country slopes gradually to the Pacific and much more speedily to the Gulf coast. West of the sierra backbone the sloping plains are cut through by innumerable arroyos or river-beds, while above the general level of the plain

rise thousands of isolated table mountains known as *mesas* and *picachos.* The *mesas* are the flat lava-covered mountains, while by *picachos* are understood those mountains which have had their tops worn down and have assumed a more pointed appearance. The nature of the high granite peaks of the sierra is that of sharply-pointed barren pinnacles, most beautiful on account of their wild and irregular form, the absence of trees causing them to stand out more sharply. The lava, or rather the trap rock, is the most prominent feature of this part of Baja California. It seems that in a not very remote geological period this whole country has been flooded from one end to the other by numerous eruptions of basalt or trap, which, when cooling, assumed the well-known forms of innumerable narrow parallel columns. Nearly all the cañon walls and walls of the river-beds consist of such perpendicular columns, and when travelling through any one of the many cañons we may without much difficulty imagine that the walls on either side have actually been built up by artificial means. But it is not only in the walls of the cañons that we meet with these rocks. The whole country is overlaid with them to such an extent that we may travel for days over hundreds of miles without finding any other surface than basalt. In places the columnar nature of this rock has caused the surface to be broken up into continuous piles of basaltic stones, situated so close together that it is impossible to step anywhere except on a rock. Such is the nature of hundreds of miles of territory, the whole surface of which looks as if it had been most skilfully paved with rocks from the size of an egg to that of a small barrel. Between these rocks there may or there may not be a few inches of ashy soil deep enough to sustain a few grasses or bushes or a few agaves or cacti.' As to the possibility of farming this land it is simply out of the question, except in the arroyos or on the deep and softer soils in the immediate vicinity of the coast. But the great plains of the interior of this part of Baja California must forever remain the barren waste they are to-day, only suitable for occasional grazing by cattle. This lava or basalt blanket, which covers everything, varies greatly in thickness. In places it seems only a few feet thick, while in other places we can see how the water-courses have cut their way through hundreds of feet. Here and there on the plains we meet with smaller or larger piles of trap rock, appearing as if they had been piled up there carelessly in order to be ready to supply some intended gigantic building. These are evidently places of eruption, from which the basalt has spread in all directions, like a puddle of cement, over its gravelly bed. Within a few miles of the coast this basalt blanket generally gives out, having been washed away or undermined by the torrential floods and rains. In such places the land is slightly rolling, exposing the white or yellowish, ashy and volcanic soil underlying the great basalt covering. Such is the aspect of the country from La Paz to San Ignacio and San Roque in the north. As all the settled places, without any exception, are situated in the bottom of some cañon or arroyo, they do not in any way disturb this general aspect of the country. The settlements are never seen from any distance, but we stumble upon them suddenly and unexpectedly, their vegetation even never projecting above the general level of the plain.

The sierra backbone is a most interesting one. The view of the high and picturesque peaks may be enjoyed already from the Gulf. They assume the most fantastic forms, often of great beauty, especially when colored by the glorious and marvellous sunsets of this region. In the high sierra we meet with an increase of vegetation, and pines and palms are there common in the most favored localities. Seen from a distance, however, the peaks look barren and bare, and do not present any outlines rounded by forests. Such forests are found only in the sierras of the Cape Region and on the top of the high San Pedro Mártir.

Volcanoes are not unknown in this country, though none is now active. The largest volcano is the one known as Las Virgenes, situated northwest of Santa Rosalia. It may be seen from the Gulf, and presents a fine and magnificent view. As I have not ascended any of the high mountains in this region, I can only refer to them in a general way.

As regards vegetation, little can or need be said. To the botanist there is an endless variety of interesting and remarkable plants met with everywhere, but to the average traveller there is little to charm the lover of forests and trees. The great basalt blanket is barren, and presents no trees. Here and there we find thickets of shrubs and cacti, small in height and dry in appearance. In favorable places, where the basalt has become more disintegrated, these shrubs grow higher and denser, and we find even thickets of the agave used by the natives for the distillation of mezcal. It is especially the slopes of the walls of the cañons which offer the best-growing places for the agave, but occasionally we also find it on the mesas, where the soil is deeper and where the basalt blanket has been broken up.

In the river-beds we sometimes meet with a dense and most picturesque vegetation. Here are enormous, tall cacti, like columns cut out by artificial means, and with dense thickets of the beautiful mezquite in numerous varieties. Here we also find groves of the stately fan palms (*Washingtonia Sonoræ*). But all this is only in places where the water is near the surface or where the rainfall is more constant. At the time of my visit many of these once so beautiful cañons were drying up and the trees were dying from lack of moisture. Trees which must have been several hundred years old were perishing because, as I was told, no water had fallen for four or five years and no floods to irrigate the bottom lands had come down for that length of time. Along the west coast there is even less vegetation in the cañons, and we travelled for hours and days without seeing anything but bare soil and here and there a few dwarf bushes. The soil is mostly glistening white, and the whole country looks as if modelled in clay. But let only a few copious rainstorms come and the barren ground will cover itself with a beautiful mat of flowers and green, and the branches of the shrubs will at once shoot out leaves. The whole country will then change in a few days from a barren waste to a paradise.

The promontory of the Santa Clara and Sierra Pintada requires a few words separately. Here the mountains are less basaltic and more volcanic, and accordingly the soil is deeper. The effect of this is that even in regions where the rain is very scant and irregular the vegetation is better. We find there miles and miles covered with a low and vigorous shrub, the *Torote*, which in places actually spreads over the ground as a kind of low forest. These torotes are most wonderful to look at. The trunk is enormous for the size of the tree. It branches itself close to the soil, and the many branches follow and rest on the ground for ten or more feet from the stem, the whole tree forming a large semi-globular bush of ten or more feet in height. If to this we add that each branch is almost as thick as the tree itself, and that it curves and bends itself like an immense snake, we can form an idea of the main vegetation on the slopes of this coast. These torotes stand at considerable distance one from the other, and, as they are low, they do not in the least hide the general outlines of the ground. Though small, these trees give considerable shadow—the only one that can be derived from the vegetation in these parts. At the time of my visit a rain had fallen—the first for several years—and while many torotes had already assumed their leaves, others were just in bloom. And lovely blooms they were, in clusters of beautiful lilac, with a sweet, delicate aroma, the whole bush appearing as a single clump of delicate violet lace. Along the seashore there is for several miles inland a low vegetation of dry and grey-colored bushes, seldom over two or three feet high. Most of these are so strongly aromatic that the mules refuse to eat them, even when they are dying from want of food. Only during the rainy season is it possible to find grasses and annuals in bloom. But very little rain is actually required to rejuvenate this arid country. As we look about us to the right or left, we find but barren plains, scantily covered here and there with low, dry-looking bushes. The *mesas*, or table mountains, which may be seen lining the horizon in this part of the peninsula, stand out boldly and sharply against the sky. On the side towards the ocean these mesas are steep and well defined, while towards the east or the sierra they are made out gradually in the general slope of the country. More towards the east the peaks of the sierras are seen, ragged and sharp—here like needles, there again as pyramids. None of these mountains are covered with sufficient vegetation to soften their outlines, the shrubs which are found being hardly large enough to be noticed until we are close upon them. In a general way the vegetation of this part of the peninsula resembles the barren parts of the Mexican mainland, and especially Sonora and Sinaloa. A large part of the genera are similar, but many, of course, are different, and peculiar to Baja California.

Of the animals met with in these parts there is here only room for a few remarks. We found on our trip to the country hares, rabbits, and deer almost every day. Ground squirrels and chipmunks are not uncommon, but not as numerous as in Alta California, this probably being due to the difficulty of burrowing through the basalt surface. But even the barrenest parts have their birds, and we could wake up every morning hearing the birds singing, even if there were nothing but tall cacti to be seen. In the tallest of these columnar and spiny vegetable monsters various species of wrens and other birds make their nests, partly protected from the attacks of snakes. Snakes and lizards are found everywhere if we look for them; but they are much less numerous than in the Cape Region, in which place they occur in countless numbers. If we turn over stones and fallen cacti we are nearly always rewarded by finding scorpions, spiders and centipedes of numerous kinds. If we search the rocks and sheltered places in the cañons we uncover heaps of shells of various kinds of land molluscs. Or, if we wait until the first rain falls, we may collect the same varieties of shells alive, crawling about over the rocks, only to disappear again when the shower is over. The size and variety of these Baja California land shells are simply wonderful. In color they are white, in size they range from half an inch to three inches or more. Every cañon, almost, has its peculiar variety, and every isolated mountain rewards the collector with new and interesting species. The great resemblance between the land shells of the barren plains of Baja California and Chile has often been pointed out, but so far no exhaustive comparative researches have been made. If such a connection between the two barren countries of the Pacific Slope could be established, it might point either to an ancient continuous barren climate extending from one country to the other, or it might indicate a succession of islands existing formerly some distance out from the shore of the Pacific. Such islands, if sufficiently far from the mainland, would necessarily be barren and dry and in no way partake of the tropical and exuberant nature of the Mexican and Central American mainland. Such islands would readily form the connecting links over which a fauna and flora could pass, even by the Equator, from one distant country to the other.

The great number of land shells found in these barren regions is simply marvellous. In some localities it would not be difficult to collect cartloads of them. We need only lift the stones to find them dead by the thousand. The live shells escape farther in, where it is difficult to follow them. But it is not alone the shells which are so plentiful in this dry country. As soon as the rain has set in and the country has got a general soaking, the whole nature changes as with the waving of a magic wand The trees cover themselves with foliage, countless beetles, butterflies and other insects appear all at once and swarm everywhere. Every flower and every bush is a zoological garden, every pool an aquarium, every sheltered and damp nook is alive with snails dragging their turreted or rounded shells on their backs. But a few weeks of dry weather change all this. The insects die, the plants dry up, the snails seek their summer or winter homes, far in among the rocks. The bushes shed their leaves, the dust gathers, the rocks become heated, and the whole country assumes an aspect as if it had just been created out of white, dry clay. The biology of the mountains is slightly different. There we meet with taller trees, and even with forests. Springs are running all the year round, and a green vegetation is always found in sheltered and favored nooks. The eastern coast is much more densely covered with bushes or low trees, and as we ascend, even a few hundred feet, above the sea-level, the barrenness of the country is considerably modified. Yet we must not forget that in all this barrenness there are oases hidden among cañons so completely that they are not perceived until we are at their very border. But these places are generally cultivated ones. No water could be allowed to go to waste on wild shrubs and trees; every drop is, in a crude way, appropriated for irrigation and for the creation of palm groves and maize fields.

In Alta California the rain occurs during the most unfavorable season of the year; in Baja California it occurs during the most favorable season; and this difference in season is fully sufficient to explain the enormous vigor of animal and vegetable life which is so characteristic and manifest during the short periods of rain in the peninsula of Baja California.

6. SETTLEMENTS AND AGRICULTURE.—It is not my intention, nor is it feasible in this paper, to refer in an exhaustive manner to the possibilities of agriculture in Baja California; but as some readers will naturally ask, what, after all, this country is good for, a few remarks upon what actually exists may prove of interest.

Artificial irrigation exists only in comparatively few localities, and no great expense has anywhere been resorted to in order to supply water for irrigation purposes. The water is taken as it comes and wherever found. When it is running it is used up; when it is not running the plants are allowed to suffer. There are no large dams and no tunnels, and no great effort is made to keep the water back and to husband it in order that it may irrigate a few more acres. In only a few places, like Comondú and in San Ignacio, is the water supply said to hold out. In general it has been diminishing during the last fifty years. Thus at San Xavier we can see hundreds of acres which years ago were irrigated, but for which water cannot now be had. This may be due to diminished rainfall, as is the opinion of the people, or it may simply be the result of the destruction of the irrigation ditches made by the Padres. Remnants of such cemented ditches are seen in several places, but no apparent attempt is made to repair them. This lethargy is partly due to the fact that these irrigation works were constructed and maintained by Indian labor, free of cost. The Indians are now all dead; and as thus slave labor does not any more exist, the works of the *antiguos* are not repaired. Another reason is that the people are grossly ignorant and lack enterprise. This is the more important as population is not wanting. Nearly every family raises ten or more children, but as soon as the boys grow up they emigrate in order to seek for better surroundings in other countries. Then, again, the nature of the country is such that, even if an increase in production could be accomplished, it would be difficult to dispose of this product. There are no means of communication, and most of the produce must be consumed at home. There is no doubt but that with a comparatively small expenditure of money for the development and storage of water the productiveness of the country could be enormously increased. This increase will, however, not be likely to be brought about until some new impulse is given to the mining industries, which alone can employ a large number of men and families, who necessarily must become large consumers of food products. As far as I can see, there are few industries which can accomplish this but coal and coal oil. I am satisfied that in the near future both these products will be exploited in or near Baja California, as they are known to exist there in several localities.

Here a word or two may be said about the natural products, such as may be had without special cultivation. Foremost among these is the orchilla, a lichen growing on the stems and branches of low bushes along the coast. This orchilla looks like the gray moss found on trees in every country; it is a few inches long and resembles a gray beard. There are several kinds growing on the bushes, but only one species is valuable and worth gathering; and at the time of harvest we find camps of Mexicans here and there along the coast. When one place is exhausted the camp moves to another locality. In five years or so the orchilla has grown again enough to be ready for another harvest. The only danger that the orchilla will be finally exhausted is in the unscientific way of gathering. Along with the valuable variety grow one or two which are worthless for the production of dye. These varieties are allowed to remain untouched, and as a consequence they will multiply more rapidly, and finally will drive out the valuable kind.

Another source of income may be found in the agave, which grows in many localities. Its base is now used for the production of mezcal, but the fibres of the leaves are said to be strong, and may be used for the manufacture of ropes, etc. No effort has been made to utilise it for such a purpose. Another source of revenue may be derived from the inexhaustible banks of clams found on the coast. These clams were the chief food supply for the ancient Indians, who have thrown up the shells into veritable mounds, twenty or more feet high and miles and miles in length.

The trap blanket which covers the country explains the distances of the cultivated places from each other. These latter are generally several days' travel apart. They are, of course, only connected by trails, as there are no roads outside of the mining districts of the peninsula. But these trails are only trails in name, not in reality, as no work has been done on any of them except in the immediate vicinity of the villages. In many places the trails are so stony that the mules have to step over the boulders, and for miles and miles the progress is like that of a snail. We will now consider a few of the principal cultivated places in this part of the peninsula.

LORETO, once the most important town in Baja California, is now a mere hamlet of a few dozen houses. The ruins of the famous Mission are yet standing, and part of the church is used for service. The decay of the place dates back some thirty odd years, when the town was partly destroyed by an earthquake, followed some years later by a flood, which destroyed most of the houses and many of the plantations, even changing the course of the river. There are now only a few hundred inhabitants in all. There are several hundred date palms, and perhaps two hundred acres in cultivation in various crops. The date grows without irrigation on account of the nearness of the water to the surface. As far as I can learn, there is no export of any consequence—at the utmost a few small boatloads of dates, mezcal, hides, dried beef, etc.

SAN XAVIER.—The Mission church is the handsomest in Baja California, and is not equalled by any in Alta California. The style is Roman, and of great elegance and beauty, and the construction is of stone. The church is well preserved, and could, with little repair, last many hundreds of years more. It is the best-constructed Mission on the whole Pacific coast. Of the Mission part, however, little remains. These accessory parts, which were made of adobe, have long ago fallen. Of the irrigation works of the Padres little remains. There are several *pilas* or water tanks left, but the cemented ditches have fallen to decay, and water is now conducted in open earth-ditches. Consequently, many acres which were formerly irrigated are now dry. The people lay the cause to diminished rainfall. It is probable that they are partly correct; but certain it is that with some little work in saving the water and repairing the ditches much more land could be cultivated and irrigated. There are not over twenty-five persons now at the Mission, the guardian and his family constituting the largest part of the population. Perhaps fifty acres are under cultivation. We admire many large olive trees, which must date back to the first settlement by the Padres. There are also fine old Mission fig trees of enormous size. The olives belong to at least three distinct varieties. Oranges, cane, maize, beans, bananas and other tropical fruits do well. San Xavier is a lovely spot, an oasis in the desert; but shut up as it is in a narrow cañon, perhaps a thousand feet wide, it is subject to great heat, and can only be agreeable as a dwelling-place during the cooler part of the year.

In the vicinity are a number of primitive distilleries for aguardiente, which is exported to other parts of Mexico.

COMONDÚ.—This place is one of the best known in Baja California. There are two settlements in the arroyo, about three miles apart. The lower place, where the town proper is situated, is known as San Miguel de Comondú; the upper part, where is the Mission, is called after the church San José de Comondú. The Mission is now mostly in ruins, and of the church there remains only the shell. The inhabitants told me that the Government some years ago ordered the church sold as bricks to any one wishing to buy. As a consequence, little now remains of this once beautiful though small church. A single room in the Mission is yet used for service. The whole valley of Comondú is irrigated from two large springs. Some thousand acres are under cultivation, and the orchards and fields extend some seven miles down the cañon. This arroyo opens out in the lagoon of San Jorge, known as the *estero.* The place known as San Jorge is not situated in an arroyo. Comondú is eight leagues from the Pacific and eighteen leagues from the Gulf. The arroyo in which Comondú is situated does not come from the sierra, but rises in the plains. The irrigated part is a forest of palms, fig trees, oranges, lemons, olives, vineyards, etc. I was told that the following figures of the production of this beautiful place are fairly correct: dried black figs, about ten thousand arrobas; raisins (*pasas*), about two thousand arrobas: dates, about two thousand arrobas. There are about 1,600 date trees. Some three thousand arrobas of panoche, or raw sugar, are produced. The figs, as well as the raisins and dates, fetch, as a rule, 50 cents the arroba. They are packed in rawhide bags and transported on muleback to Mulejé. During our stay we found great hospitality in the home of Don Francisco Rodrigues and Doña Josefa Romero, to whom I am indebted for the above information. There are about four hundred inhabitants in the two places.

PURÍSIMA.—From Purísima to the Pacific Ocean there are about eight leagues; to the Gulf, eighteen to twenty leagues; to San José de Gracia, about forty leagues. From Purísima one trail runs to Mulejé over the mountains and to the Gulf, while another trail runs along the western coast to the Estero El Ranchito, or, as it is known on the American maps, the San Ignacio Lagoon. The arroyo of Purísima is one of the largest in Baja California, and one of the best watered. The water is permanent at the point of the settlements, and with care many times the present extent of land could be irrigated. Now there is irrigated a strip of land thirteen leagues long and from a quarter of a mile to more in width. Our host, Don Trinidad Mayoral, and his son, Don José Mayoral, gave me the following information as regards products. Panoche, or raw sugar, is only produced for home use. There are exported about 7,000 arrobas of raisins and 8,000 arrobas of dried figs. These are of the black kind, known in California as the Mission, and are of superior quality, but they are poorly handled. They are much sweeter than any produced in California. It is interesting to note that it is principally the first crop, or the *brebas*, which is dried. When the water is low (in years with little rainfall) the stretch of land irrigated is reduced to five leagues. There are few dates grown in Purísima. This is due, in my opinion, to the shallowness of the soil, which seems to be underlaid by hard-pan. It is this very hardpan which causes the water to remain so long in the river-bed, and forms the bottom of the water-holes.

There are, perhaps, two hundred and fifty inhabitants in the settlement of Purísima.

Purísima is famous for its many water-holes. In the rainy season, and when the rain is falling, sufficient water comes down in the river to form a continuous stream all the way to the ocean. But as the rain stops and as the season advances the water becomes less and less, and would soon go down to almost nothing but for the many water-holes, which stretch along for many leagues. They are of all sizes and depths, but generally they are quite large. Many are several hundred feet across, and are said to be a hundred feet or more deep. The natives believe them to be bottomless. At my visit at the end of the dry season the holes were all connected by a small stream of running water, and seen from a distance it appeared as if we had before us an immense river—immense for this country at least.

In the deep and cool water-holes we find fishes and terrapins, or, as the latter are called there, "ahuamas." The species is of much larger size than any found elsewhere in Baja California outside of the ocean.

The Mission church is the poorest and smallest I have seen in the peninsula. It is in fair preservation, but offers nothing of any interest as regards its architecture—a mere small rectangular building, without towers or ornamentation.

SAN IGNACIO.—This is by far the largest place in the central part of the peninsula. There is a fine old Mission and church, but not as well built as the one at San Xavier. The arroyo is irrigated from a few large springs, and so abundant is the water that it runs for miles down the cañon and forms ponds here and there. There are about 60,000 date palms divided among the many settlers. The number of inhabitants must be at least one thousand. Hardly anything but dates is grown. Nearly all the dates are exported by mules and burros to Santa Rosalia. Most of the crop is distilled into aguardiente, and what is not distilled is sold on the mainland of Mexico.

A word needs to be said about the quality of the products. The soil all over Baja California consists of an ashy loam of volcanic nature, evidently deposited from volcanoes in a shallow ocean and gradually elevated. It is of great richness in mineral matters, but, except in a few localities, poor in humus. The quality of the fruit and cereals, etc., grown in this soil is very fine, though no good varieties have been introduced. The grapes, dried into raisins, are of the "Mission" variety—a bluish-black grape—very sweet, but otherwise unsuitable to raisins. The seeds are small and the skin is thin, but as the grapes are small the raisins can in no way compete with the Muscats grown in California. The dates are perfectly at home, and wherever a seed is dropped in a moist place it soon grows and fruits, but the quality of the variety is poor. It seems to me that the date grown everywhere in Baja California belongs to some ancient, wild stock. It certainly is different from any of the better Arabian or Persian dates imported to California. The meat is coarse and stringy, and the seed is simply enormous, just like that of the Canary Island species. This date is not particularly sweet, and it cannot compare with better varieties from Africa. There are two or three kinds, all with enormous seeds. One variety is very dark, while one is light yellow. A kind growing at the Mission of Los Dolores is said to be a free-stone to such an extent that the dates can all be pulled from the cluster, while the seeds remain attached to the stems. But these coarse dates seem to me to be extremely valuable for cooking purposes. The time to use them for this purpose is when they are nearly ripe but yet hard. If boiled with meat, they are then very palatable, imparting a fine flavor to the dish. I think that an industry of canning dates would be profitable.

The figs grown in Baja California are superior to those grown in any part of the United States or in Sonora. They are larger and sweeter, and also better flavored. But so far only the black Mission and a worthless fig with white skin and large seeds are grown, and no effort has been made to introduce finer varieties, and no one seems even to know that there is anything better to be had. Under such circumstances the prospect of improving horticulture in Baja California is not promising. What is said here about fruit holds good also as regards grasses and vegetables. In every settlement there are waste lands soaked with water through seepage. Instead of planting useful grasses in such places we find nothing but weeds and the bitter *Yerba mansa*, which is useless for pasture. With stock-raising it is very much the same. During a succession of rainy years the cattle thrive well, only to die in years of little rain. This, of course, may not be the fault of the people; but I think that some grasses might be introduced which would require less rain. The Australian salt bushes, and hundreds of other plants, might prove a boon to the country.

As regards the people, it can be said that they are very friendly and hospitable, and if treated right can be depended upon. There is not the least danger to any one, and even the most inexperienced traveller need have no fear, as robberies and murders are unheard of. The inhabitants of Baja California compare very favorably with those of any other country, and their backwardness must in a great degree be ascribed to the extreme isolation of the peninsula and to the relatively small part of the land capable of cultivation.

7. THE PLACER MINES OF SIERRA PINTADA.—As one object of my journey was to study and report on the placer mines known at that time as the Santa Clara diggings, a few words about the country where they are situated may prove of interest. The promontory, or peninsula, in which these mines are situated is separated from the mountainous region around San Ignacio by a vast plain, which in a recent geological period must have been submerged. At that time the Santa Clara and Sierra Pintada Mountains formed a succession of islands, of which Cerros and San Benito Islands are the continuation and the remnants. The Santa Clara range was separated from the Sierra Pintada, and both were separated from the islands further west. There is now no forest on any of these mountains, and water is extremely scarce. Since the discovery of gold several springs, not formerly known, have been found, and it is probable that several more exist. The mountain peaks are about

3,000 feet high and much broken. In the Santa Clara region the peaks are pointed, while in the Sierra Pintada they have the shape of table mountains, with here and there a few sharper *picachos*, or peaks. The gold in the placers is found in a stratified deposit of coarse white, ashy soil. The mountains themselves are built up of volcanic ashes, stratified and overlaid by lava and, to some limited extent, by basalt or trap. On account of the absence of running water, all the gold is recovered by the dry-wash, that is, it is separated by screens, the dusty soil being fanned away, the heavier gold remaining. At my visit the main settlement was at a place called San Andrés, a few miles from the landing-places of San Roque and Asunción. Here wells have been dug to the number of a dozen or more, at the foot of a mesa, and the water was hoisted out and sold at one real (12½ cents) a burro-load. About 1,000 gallons were thus taken out in a day. The water was carried in 20-gallon kegs on burros to the placer mines situated some sixteen to twenty-five miles away in the mountains, where it fetches 1 real the gallon. The gold region is between lat. 28° and 27°, and mostly on the west side of the Sierra Pintada.

At San Andrés we found some two dozen tents, and one house made of lumber. At the mines there were nothing but tents. Some one thousand men had been at the mines at one time, but at my visit there was not half that number. Everything is carried to the place by small schooners or by mules from San Ignacio. But on account of want of water and food, most of the mules die or are made useless in a few weeks, and so far no one had made any profit in hauling goods. Everything is dear, and I had to spend twenty-five dollars in feed and water a day for my four mules. A sack of flour was worth eight dollars, and so on. The price paid for the virgin placer-gold was thirty-two dollars per ounce. There is plenty of gold in the gravel, but on account of the slow process and the time consumed in fanning it out a man would only average two to four *adarmes*[*] of gold a day. One *adarme* is worth about $2 silver. So far, only about 75,000 dollars worth of gold had been taken out *in all*. It will thus be seen that only those content with the very poorest wages can be satisfied with the diggings. Many of the miners were Indians from the mainland. The rest were Mexicans from the mainland and the peninsula. Only one hundred Americans had been to the mines at one time. More miners had returned than were remaining. Still, it is my opinion that these placers will be worked for many years to come by Mexicans, satisfied with gaining a net profit of from fifty cents to one dollar a day. The placers were rediscovered in the summer of 1898 by some Mexican miners. There had always been rumors that in former years, during the time of the Missions, the Padres had received large quantities of gold from this region, through the Indians. At the time of my visit there was no one to collect a tax on the claims, and any one could dig wherever he pleased. If there had been running water for washing the gold, there is little doubt but that these mines, which now pay so poorly, would have been famous and immensely profitable.

---

[*] The *adarme* is the sixteenth part of an ounce.

The climate of the promontory, including the Santa Clara and Sierra Pintada mountains, is not by any means as mild as might be expected from its southern latitude. Fogs are persistent during the spring, and high winds are not uncommon. Miners who did not provide themselves with heavy covering have complained of various ailments—rheumatism, etc. The situation of the promontory is such as to catch all the fogs and high winds which pass down the coast with the northwest trade winds. The low desert plain situated between the coast mountains and the sierra favors a draft, which causes the winds to sweep over this country with unusual force. The promontory, which runs in a direction north and west, consists of at least two distinct mountain ranges. The southerly one is known as the Sierra de Santa Clara, while the more central one bears the name of Sierra Pintada. The two ranges are connected by low hills and by table mountains. Seen from a distance, one can readily make out that the two ranges or sierras are quite distinct. The placers were at first called the Santa Clara placers, but little by little the name of Sierra Pintada seems to have been adopted. As a fact they are not situated in the Santa Clara range, but in the Pintada.

When I was in the region a large number of copper claims had been located, and some ore proved to be very rich; but it remains to be seen if it can be mined, the scarcity of water and fuel being the main difficulties. The fuel question may be solved by the importation of anthracite coal from Sonora; but it is difficult to see how water can be procured where natural springs are so few and so poor in quality. Near the shore-line water may, however, be had almost anywhere by digging shallow wells. Such wells have now been dug both at San Roque and at Asunción. But they are situated on the very beach, and would be too far distant from the mines.

8. MOUNTAIN PEAKS.—As has been already stated, the central part of the peninsula is traversed by a sierra or mountain chain, from which rise a large number of sharp and beautiful peaks. This main

sierra is situated much closer to the Gulf coast than to the Pacific. On the maps which have been published only a few of these peaks are indicated by names In order to supply this want I tried to ascertain the correct names of as many peaks as possible, though I had only opportunity to ascend one or two of the lower ones. I have marked these names on the map, the spelling being that used in a Mexican Saints' Calendar. The elevations given are those marked on the U. S. Hydrographic Charts Nos. 219, 220, 221, and are only approximately correct.

Beginning in the south and proceeding northwards, I ascertained the names of the following peaks visible from the coast or from the trails along which we passed:

San Francisco, 1,578 feet, west of San José island.
San Miguel, 2,514 feet, west of Habana island.
La Cafetera, 2,118 feet, west of Sta. Cruz island.
Alta Gracia, 4,773 feet, west of Danzante island.
La Palmilla, 4,660 feet, west of Puerto Escondido.
Tabor, 4,151 feet, west of Carmen island.
Victoria, 3,756 feet, west of Carmen island.
Las Parras, 3,674 feet, west of Loreto and immediately north of the road to Mission San Xavier.
Carrizal, 4,148 feet, north of Las Parras.
Agua Verde, 4,920 feet, north of Carrizal.
La Giganta, 5,794 feet, north of Agua Verde.
Los Encinos, —— feet, north of La Giganta.
Las Cruces, —— feet, north of Los Encinos.
Carrizal, 2,716 feet, north of Las Cruces.
Guajademí, 3,943 feet, west of Concepción Bay.
Zacatecas, 3,710 feet, north of Guajademí.

The last two are the most prominent peaks in this region.

Passing in a half-circle to the north towards Santa Rosalia and Las Virgenes, the following peaks are situated almost in the centre of the peninsula, and are probably seen from both the Gulf and the Pacific Ocean:

San Vicente, 3,890 feet, west of Guajademí.

San Joaquín, —— feet, west of Guajademí and Zacatecas.

El Valle, 4,212 feet, at the head of the arroyo San Juan.

Las Cañadas and Las Palmas, both very prominent peaks, north of El Valle and at the head-waters of San Juan and San Pedro.

El Puro Año, 5,828 feet. This is the highest mountain in the central part of Baja California. The whole mountain chain on which this and many other peaks are situated is known under the general name of Sierra de las Palmas.

Las Palmas is generally supposed to extend from the vicinity of San Pedro, in the north, to El Valle, in the south. From El Valle southwards the sierra is known as Sierra del Valle.

San Pedro. A very high cluster of peaks, situated north of El Puro Año and east of Patrocinio, and at the head-waters of San José Magdalena, which latter arroyo opens in the Gulf.

San Tadeo, or El Pilón de San Tadeo. A most remarkably-shaped peak, situated north of San Pedro, and sufficiently isolated to be seen from many sides.

La Trinidad. A prominent peak north of San Tadeó.

Santa Isabel. A cluster of peaks or sierra, of which La Bandera is the highest point. La Bandera is not a sharp peak, but a high, rounded crest which, when seen from the west, has something of the shape of a flowing banner; a sharp peak at its very northern end, recalling the staff of the banner—hence the name. It is uncertain which of the peaks marked on the map is intended for La Bandera, but it is possibly the one marked 5,202 feet. It must be remembered that only a few of the more prominent peaks were measured by the U. S. Government Survey and marked on its charts.

Santa Maria. A peak east of the Cerro de la Bandera, situated at the head of a large arroyo of the same name and flowing into the Gulf.

La Ascensión. A high sierra north of La Bandera.

Santa Cruz, north of La Ascensión.

Santa Lucia, north of Santa Cruz. North of Santa Lucia there is a great depression in the sierra, through which leads the road to Santa Rosalia.

San Ignacio. North of this pass we have the beautiful mountain complex known as Las Virgenes. This consists of three prominent peaks—Las Tres Virgenes. The central one of these is an extinct or semi-extinct volcano, known as El Volcán. It is said to give off at times strong sulphur fumes and a number of steam geysers, indicating that the internal heat is not quenched.

Cerro Colorado. A reddish-colored mountain immediately north of San Ignacio.

Picacho de Santiago, 3,764 feet, is the most prominent peak north of San Ignacio, and can be seen from that point.

Sierra de San Francisco. This is the very highest sierra seen to be situated north of the Picacho de Santiago.

Natividad. An isolated mountain peak, situated well out on the plain west of Picacho de Santiago.

It may not be inappropriate to state that in Mexico, and especially in the peninsula of Baja California, a "sierra" is an isolated mountain, which is separated from its neighbours by deep cañons and plains or by lower hills. Thus, the mountain chain from one end of Baja California to the other is a succession of different "sierras," each one of which possesses a different name. A general name for the whole mountain backbone is not in use. In Alta California the continuation of this backbone is known by one name—Sierra Nevada—but in Baja California no such general name is in use.

As regards the geological formation of the mountain peaks little is known. From my own few observations, it appears that the majority of the peaks consist of granite, their sides being covered with a blanket of trap. At one place, where the trail passes the foot of the peak, Las Parras, on the road between Loreto and San Xavier, a most interesting geological formation was observed. Enclosing the pass are immense walls of trap, beyond which the granite peak is visible. On the south side of the pass, at its highest point and close to the road, I found this trap rock to be full of large and small veins of granite. One of the largest veins could be distinctly followed for several hundred feet up toward the granite peak; and there can be no doubt about the nature of the vein. In this instance the granite is, accordingly, of very recent formation, having in a liquid state filled cracks in the trap rock instead of *vice versa*, as is generally the case. The granite veins are distinct and well defined, and their proximity to the main trail through the pass will make it easy for any one interested to verify this statement as regards their nature.

The immense trap covering, which has spread over the central part of Baja California, has been referred to several times in this paper. It must have been of a recent geological time, probably of the same age as in California. The arroyos or water-courses must have had previous to the great eruption of trap, to some extent, the same position as now. The walls of the present arroyos—at least many of them—consist of trap rock, hundreds of feet thick. Towards the mesas this rock diminishes in thickness, and it appears plain that the thickness in the arroyos is due to the fact that the eruptive trap followed previous depressions and arroyos, which, to a great extent, coincided with the present ones.

To this rock is due the formation of nearly all the mesas, so very characteristic of the region. The hard trap has protected the underlying layers and prevented erosion. The nature of the cañons and arroyos is also due to this rock. Nearly every arroyo is lined by perpendicular walls of blackish trap, forming a smooth and even rim at the top—the natural border of the mesa.

9. LAGOONS OR ESTEROS.—EL RANCHITO.—This is the large lagoon is marked on the U. S. Government maps as San Ignacio Lagoon. This latter name is not recognized or even known in Baja California, and when I inquired for such a place no one understood what was meant. The lagoon, as well as the whole of the surrounding country, appears to be in a state of elevation—the lagoon itself becoming smaller and smaller even during recent years. The sandy plains around it, which occupy an immense territory, appear to have lately risen from the Pacific.

EL COYOTE.—This is the name of the next largest lagoon of this part of the country near San Ignacio. It is situated a little to the west of El Ranchito, and is only one-third as large as the latter.

OJO DE LIEBRE.—This is the real name of the large lagoon known in the United States maps as Scammons Lagoon. This latter name is not used by the inhabitants of the country, and is not even known, except to a few sea captains who have had the use of the United States maps. The Mexicans do not use the name laguna (lagoon), but designate these three lagoons simply as El Ranchito, El Coyote and Ojo de Liebre. The lagoon known as Black Warrior Lagoon is so named after a vessel which was stranded there many years ago. The Mexican name I could not ascertain.

10. POSSIBLE COLONISATION OF THE PENINSULA.—One of the first questions asked by those who are interested in the agricultural improvement of the peninsula of Baja California relates to the possible colonisation of the country by foreign immigrants. So far many efforts have been made to induce settlers to come and develop the latent horticultural resources of the country, but nearly, if not all, of these have failed of success. It is but natural to think that a territory so immense as that of Baja California should possess many places sufficiently productive to induce and attract agriculturists from abroad. I think the chief error committed has been that of self-deception and an over-estimation of the constancy of the rainfall of the peninsula. In the foregoing pages I have endeavored to show that while the rainfall is at times sufficient or even abundant for the raising of crops, periods of drought are so frequent that no reliance should be placed on the constancy of the rain. Every colonisation enterprise in the peninsula has been started during or after a period of unusual precipitation, and, similarly, rain has failed during a following period of drought. People visiting Baja California during years of good rainfall can hardly help being struck by the productiveness of the country and the salubrity of its climate. Ignorant of the true climatic conditions, which are sure sooner or later to manifest themselves, they suppose that this fertility is recurrent yearly, when in fact it should be rated as an exception. The rolling hills, which for a year or two will produce splendid crops of grain, are almost certain to remain barren for several years following. From this it follows that no crops are assured which rely upon the natural precipitation alone. In the mountains there are, of course, yearly and sufficient rains, but on account of their distance such places are for the present unsuitable for permanent settlement of agriculturists. But the water which falls so freely in the sierra might be used elsewhere in the form of irrigation; and this alone can make agriculture a permanent success on the peninsula. As all springs and streams of any importance have already been occupied and utilised for this purpose, it is evident that some other means must be resorted to in order to extend the

settlement of the country. Even a casual observer will see that wherever irrigation is practised it is of the very crudest kind. Nowhere are any large and permanent dams made, nowhere is the land terraced or even levelled, and nowhere do we find any cemented ditches which would husband the water while carried from one place to another. There is certainly not a single water-course in the peninsula which could not be made to treble or quadruple its irrigation capacity through the construction of proper irrigation works. In order to make any settlement a success, the first requisite is the construction of such irrigation works, and agriculturists should not be induced to settle there until such works have actually been constructed and put in operation. The procuring of land suitable to agriculture is the least difficult part. There are hundreds of large arroyos all over the peninsula which offer the choicest bottom-lands to the irrigator, but until dams and ditches are in operation even the choicest of these lands will remain unsuitable for settlement. In many places water for irrigation may be had by pumping; but as wood is scarce, and as oil and coal are not yet utilised, this manner of raising water cannot be resorted to at present. Irrigation works can only be constructed by rich corporations and by Government aid, and the motive which will induce such constructions will be the profit to be derived. This question of profit is one that will be answered differently according to circumstances,as what will not pay to-day may be highly profitable to-morrow. The exploiting of oil, coal and minerals of various kinds, in which Baja California is indisputably rich, will no doubt in time create a demand for supplies which can best be procured in the immediate vicinity where they are needed. When such time comes—and in places it has already come—then there will be profits in the expenditure of money for irrigation works, and settlers will not be disappointed in their expectations. The geniality of the climate of the peninsula is so unsurpassed that it alone should attract the attention of the world. While no one can live on climate alone, as the saying is, it is not less certain that climate, land, and irrigation will in time combine to make Baja California a desirable place for settlements.

11. Approximate Distances from La Paz to San Ignacio by the Central Trail.—

La Paz to Zacatal, 1 league.
Zacatal to Arizpes, 2 leagues.
Arizpes to Quelelé, 2 leagues.
Quelelé to Rodriguez, 2 leagues.
Rodriguez to Cajon de los Reyes, 1 league.
Cajon de los Reyes to Mesa de la Vieja, 5 leagues.

Mesa de la Vieja to Cerro Colorado, 1½ league.
Cerro Colorado to Arroyo de San Hilario, 2 leagues.
Arroyo de San Hilario to La Junta, 2 leagues.
La Junta to Arroyo de San Gregorio, 2 leagues.
San Gregorio to Cerro de los Liebres, 3 leagues.
Cerro de Los Liebres to Arroyo Iritú, 5 leagues.
Iritú to Plátano, 2 leagues.
Plátano to San Luis, 2½ leagues.
San Luis to Frijol, 2 leagues.
Frijol to Ranchito (situated in the same arroyo), 1 league.
Ranchito to Tepentú, 5 leagues.
Tepentú to Batequitos, 2 leagues.
Batequitos to Los Cerritos, 3 leagues.
Cerritos to Arroyo del Quepo, 4 leagues.
El Quepo to Jesus Maria, 4 leagues.
Jesus Maria to Aguajitos, 3 leagues.
Aguajitos to San Rafael, 1 league.
San Rafael to Posa Miguel, 5 leagues.
Posa Miguel to San Lucas, 5 leagues.
San Lucas to Posa Teresa, 4 leagues.
Posa Teresa to San Francisco Xavier, 5 leagues.
San Francisco Xavier to Santa Rosalia, 3 leagues.
Santa Rosalia to El Quiñí, 2 leagues.
El Quiñí to Comondú, 2 leagues.
Comondú to San Vicente, 7 leagues.
San Vicente to La Purísima, 2 leagues.
La Purísima to Purísima Vieja, 2 leagues.
Purísima Vieja to El Paso Hondo, 2 leagues.
Paso Hondo to San José, 3 leagues.
San José to Guajademí, 5 leagues.
Guajademí to El Potrero, 4 leagues.
El Potrero to Mulejé, 10 leagues.
Mulejé to San Marcos, 9 leagues.
San Marcos to San Bruno, 3 leagues.
San Bruno to San Lucas, 2 leagues.
San Lucas to Santa Rosalia, 2 leagues.
Santa Rosalia to San Xavier, 2 leagues. (Not the Mission San Xavier.)
San Xavier to Santa Cruz, 3 leagues.
Santa Cruz to San Ignacio, 10 leagues.

12. DISTANCES FROM MISSION SAN XAVIER TO SAN IGNACIO BY THE WESTERN TRAIL.—

San Xavier to Comondú, 9 leagues.
Comondú to Pabellón, 2½ leagues.
Pabellón to San Vicente, 2 leagues.
San Vicente to Purísima, 2 leagues.
Purísima to San José, 4 leagues.
San José to El Mezquital, 5 leagues. (No water.)
El Mezquital to San Juanico, 2½ leagues.
San Juanico to Carrizal, 2½ leagues.
Carrizal to Cadejé, 1¼ league.
Cadejé to San Raymundo, 2 leagues.
San Raymundo to San Juan, 2 leagues. (No water.)
San Juan to Los Dolores, 1½ league. (No water.)
Los Dolores to Arroyo de las Vacas, 1½ league.
Las Vacas to San José de Gracia, 1 league.
San José de Gracia to San Benito, 3 leagues.
San Benito to Patrocinio, 2½ leagues.
Patrocinio to Jesus Maria, 3½ leagues.
Jesus Maria to San Joaquín, 8 leagues.
San Joaquin to San Ignacío, 2 leagues.

12. DISTANCES FROM SAN IGNACIO TO CALMALLI (variously spelled Calamajé, Calamujé, Calamahi).—

San Ignacio to San Juan, 2 leagues.
San Juan to Higuera, 2½ leagues.
La Higuera to Natividad, 1½ league.
Natividad to San Estéban, 1 league.
San Estéban to Ascensión, ½ league.
Ascensión to San Pablo, 8 leagues.
San Pablo to Santa Gertrúdis, 5 leagues.
Santa Gertrúdis to Arroyo del Cerro, 4 leagues.
Arroyo del Cerro to Campo Aleman, 9 leagues.
Campo Aleman to Calmalli, 2 leagues. (This name is of Indian origin.)

14. Distances from San Ignacio to San Roque.—

San Ignacio to San Angel, 5 leagues.
San Angel to Tinaja de Santa Clara, 15 leagues.
Tinaja de Santa Clara to San Lorenzo, 3 leagues.
San Lorenzo to Cerro Prieto, 10 leagues.
Cerro Prieto to San Rafael, 5 leagues.
San Rafael to Los Placeres, 5 leagues.
Los Placeres to San Andrés, 6 leagues.
San Andrés to San Roque, 4 leagues.

15. Places on the Direct Road between San Lucas and La Paz.—

Cabo San Lucas.
La Mojonera.
El Tulí.
El Bledito.
Cerro Colorado.
Matancita.
Pozo de Gonzales.
Cerro Blanco.
Palmilla.
Salate.
San José del Cabo.
Santa Rosa.
Zacatal.
San José Viejo.
San Bernabé.
Catalina.
Las Veredas.
San Joaquín.
San Pedro.
Agua Verde.
Santa Anita.
La Laguna.
El Desecho.
Salto.
La Palma.
Caduaño.
Miraflores.
El Chinal.
Cuesta Blanca.
Juamuchilár.
Matancita.
Santiago.
La Capilla.
Mesa del Cuero.
Buena Vista.
Tecolote.
Piedras Gordas.
Ensenada de Palma.
Los Cantiles.
Palo Blanco.
Coral Viejo.
San Bartolo.
Rodeo.
Agua Blanca.
San Antonio.
El Triunfo.
San Pedro.
La Paz.

16. Places from San Jose to Todos Santos.—

San José del Cabo.
El Encinalito.
El Guayabo.
El Tulí.
Las Parras.
San Miguelito.
La Mesa Verde.
Candelaria.
La Calera.
Los Encinitos.
San Jacinto.
Palmar del Medio.
Pescadero.
Los Lobos.
Todos Santos. (Not to be confounded with the Todos Santos bay, situated near Ensenada, in the northern part of the peninsula.)